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Editorial Comment

The American Red Cross and Tuberculosis

In 1904 a Danish postal clerk, Einar Holboell, established a Christmas seal sale in Denmark. This seemed such a logical method of raising funds to fight tuberculosis that Miss Emily P. Bissell adopted it in 1907, at Wilmington, Delaware. Much to her surprise, this first seal sale in the United States, limited to a small area, amounted to \$3000.00.

In 1908 the American Red Cross, on the advice of Miss Bissell, attempted to sell Christmas seals on a national basis and the income amounted to \$135,000. Since the American Red Cross desired not to compete with the tuberculosis organization in tuberculosis work, in 1910 it entered into a partnership with the National Tuberculosis Association, whereby the Red Cross agreed to finance the actual expense of the seal sale and contribute its emblem, prestige, and name, if the National Tuberculosis Association would organize the sale, conduct it, and decide upon the proper expenditures of the funds. This proved to be a splendid arrangement and the American Red Cross deserves much credit for assisting the National Tuberculosis Association in the days when it was so much in need of help. Indeed, the Red Cross carried on the work with the National Tuberculosis Association for ten years. The Christmas seal

sale was so well established in 1920, and the National Tuberculosis Association had become so strong, that the Red Cross withdrew. During this cooperative period with the American Red Cross the income from Christmas seals increased from the \$3000 which Miss Bissell raised in 1907 to \$3,668,000 in 1920. Since that time the Christmas seal has borne the red, double-barred cross instead of the emblem of the Red Cross, and seals have been sold entirely by the National Tuberculosis Association and its component organizations.

The tuberculosis Christmas seal sale decreased in the early period of the depression until 1933, when it amounted to a gross of \$3,300,000 for the United States. Since that time, however, it has climbed back to a new high of \$6,100,000 in 1939. Five per cent of the seal sale income from the various parts of the country is sent to the National Tuberculosis Association and the remaining 95 per cent is used in the states where it is collected.

There are now 1666 tuberculosis associations and societies in the United States affiliated with the National Association, in addition to 842 tuberculosis committees, making a grand total of 2508 special tuberculosis organizations. These organizations, working in close cooperation with the National Tuberculosis

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Tuberculosis and Pregnancy*

FREDERICK H. FALLS, M.D., F.A.C.S.**

Chicago, Illinois

The problem of caring for a pregnant woman who also has tuberculosis is not a new one nor one that has recently become simplified by some new discovery of a specific drug or therapy. On the contrary, the principles upon which the management must be predicated have been postulated and accepted for many years. It would seem therefore that for the present at least, if we are to advance along the line of better management of these patients, that it will have to come from a better understanding of the principles of tuberculosis by the obstetrician and the principles of obstetrics by the internist devoting himself to tuberculosis. That as a general rule this viewpoint has not heretofore been generally appreciated, is acknowledged by most of the best men in the two special fields. Since in many if not in most instances, the problem of what to do in an early pregnancy in a tuberculous woman is first presented to a physician such as the members of this organization, I wish in this communication to present for your consideration the view point of the obstetrician based on some experience, although not as much as we would like to have had, in the hope that it will be of help to you in formulating an opinion of the management in a given case.

The majority of obstetricians agree on the general broad principle that pregnancy is a strain on the maternal organism, and that as a corollary the better the general condition of a woman when she becomes pregnant, the more favorable the outlook for both the woman and the pregnancy. A woman with a damaged heart, an incompetent pair of kidneys, a liver whose function has been interfered with, or who has serious disturbance of the glands of internal secretion such as seen in diabetes or exophthalmic goiter, is an obstetrical liability as soon as the strain of pregnancy begins to manifest itself by causing symptoms dependent on functional strain on the organ involved. If pregnancy

as it advances shows no disturbance of function of the organs involved, it may be assumed that in most cases it is safe to allow pregnancy to proceed in a normal manner, only interfering when, because of the history or physical findings, a break in compensation appears to be inevitable as pregnancy advances. Therefore, when a patient who has had tuberculosis contemplates matrimony, a careful evaluation of her pulmonary pathology should be made by her internist, who should also study heart lesions, if present, and indicate the kind of lesion and degree of compensation. Kidney function should be determined and the blood picture observed for evidence of anemia and syphilis. Her general obstetrical possibilities such as pelvic measurements, previous pregnancies, operations, and associated gynecological pathology should be studied by her obstetrician. From a consideration of these factors it is possible to make a reasonably accurate prognosis and to say about how severe the strain of labor will be and what she can reasonably be expected to stand if her pulmonary condition remains quiescent. On this basis a recommendation for or against marriage by the attending physicians can be made. In some cases the type of tuberculosis together with the nature and severity of lesions in other organs, may indicate postponement of marriage until conditions have improved.

When the patient with tuberculosis presents herself after the first few weeks of pregnancy, the problem is much more complicated because the rights of the fetus must have serious consideration as well as the welfare of the mother.

The first problem involved in such cases is an accurate diagnosis of the pregnancy. It is well known that tuberculosis may interfere with normal menstruation so that the sudden disappearance of the menstrual flow in a woman previously regular, does not have the same significance as it would have in a woman free from tuberculosis. The other presumptive signs of pregnancy, such as breast changes, discoloration of the vaginal

* Read before the meeting of the American College of Chest Physicians, Cleveland, May 31, 1941.

**From the Department of Obstetrics and Gynecology, University of Illinois, College of Medicine.

and cervical mucosa, appetite abnormalities and pigmentary changes in the skin are significant. The Friedman¹ Modification of the Aschheim Zondek test is valuable in approximately 90 per cent of cases. This depends on changes produced in the ovaries of immature rabbits following the injection into the peritoneal cavity of 10 cc. of filtered urine from a pregnant woman. The appearance of hemorrhage into the Graffian follicles of the animal 48 hours after injection indicates pregnancy.

Recently we² have described a skin test for pregnancy based on the observation that pregnant women are immune and do not react to colostrum while non-pregnant women and men are sensitive to the same solution and produce a weal and secondary arc of erythema after intradermal injection of a small amount of the antigen. This reaction is read in from thirty minutes to an hour and seems to be equally as good if not superior to the Aschheim Zondek test. It takes some experience however to interpret the reactions obtained by this procedure properly.

If and when the presence of pregnancy has been determined, the obstetrician should present the obstetrical aspect of the case, stating whether or not the evidence indicates a long difficult labor, a pregnancy complicated by serious depletion from nausea and vomiting, whether serious kidney damage is present or may be expected later, and what dangers may be expected during pregnancy and labor from anemia or endocrine dystrophy. He should also furnish information as to the dangers and difficulty of interrupting the pregnancy under the existing circumstances, and what method would best lend itself if therapeutic abortion were decided upon. If the pregnancy is to be carried forward to the age of viability of the baby, he will have to determine when and how the pregnancy is to be terminated and must evaluate obstetrical complications as they arise and direct their management. This information given freely in consultation with the internist will render the latter capable of judging the probable effect of the strain of pregnancy of the pulmonary disease, and may help in the decision as to what procedure to employ in a given case to combat the advance of that disease.

The recent advances that have been made in the treatment of pulmonary tuberculosis

through collapse therapy, and intensive and prolonged sanatorium management has still further reduced the incidence and danger of tuberculous infection and disease. Such work should not be taken as a matter of course by the obstetrician but on the contrary he should see therein a challenge as well as an opportunity to save many fetal lives that previously had been sacrificed by therapeutic abortion because of the real danger to the mother caused by the continuance of pregnancy in such cases.

In considering the problem from the tuberculosis angle we prefer to accept Goldberg's³ suggestions as to classification and management of this part of the problem. Quoting from this writer, we believe that "On a pathologic basis, we may attempt to classify the tuberculous lesions of the lung in man into:

1. Benign exudative.
2. Destructive exudative or caseous pneumonic. In this grouping, one, of course, should pay heed to serious tuberculous complications, such as laryngitis, enteritis, etc.
3. Acute Miliary tuberculosis.
4. Endo bronchial tuberculosis.

In the benign grouping, one has very little to fear from progression of disease, if the patient is protected from new exogenous infection. In the caseous pneumonic group, where collapse therapy can control the tuberculous disease by the use of pneumothorax, the patient can be allowed to carry through pregnancy, without much more than the usual consideration, as to the ordinary therapeutic regime for this disease.

However, in the caseous pneumonic group, where collapse therapy cannot control the tuberculous disease, or where other pulmonary or extra pulmonary tuberculous or non-tuberculous conditions complicate the picture, each varying pathological entity calls for a new appraisalment. This group is the one in which the greatest number of therapeutic abortions will naturally be indicated.

In acute miliary tuberculosis, the usual fatal termination within the period of six to eight weeks, leaves little from an obstetrical standpoint, unless the miliary disease occurs after the seventh month of pregnancy. Under these circumstances cesarean section should be the procedure of choice as soon as the general condition of the mother becomes so poor as to jeopardise the fetus.

In Endo bronchial tuberculosis, the location and extent of the pathology, particularly serious laryngeal involvement, has been given as an indication for early termination of pregnancy. However, with good laryngological supervision we have seen a woman carry to full term successfully, and the pregnancy then terminated artificially with a viable child. This should be the management in this type of pathology."

It is also our understanding that one of the dangers involved in some cases is that which depends on the breaking down of connective tissue protective capsules surrounding some of the healed lesions. The role played in this process by the blood ferments described by Abderhalden⁴ is problematical. That these ferments are increased in amount during pregnancy as claimed by Abderhalden and confirmed by Falls⁵ and others, is beyond dispute and their possible significance in tuberculosis as suggested by Jobling and Peterson⁶ cannot be denied. For this reason we believe that if the diagnosis of active tuberculosis is made in the early months of pregnancy and the patient is classified in the pathologic grouping, that a therapeutic abortion should be undertaken as soon as possible. If on the other hand where pregnancy has advanced to the fifth or sixth month, we feel that it should be allowed to continue at least until about the thirty-second week and terminated by induction of labor or cesarean section, whichever would seem to be the less dangerous for the mother.

The time for intervention is not always easy to determine and depends largely on how well the maternal organism is able to compensate for the additional strain of the later months of pregnancy. Severe dyspnea, rapid heart action, sleeplessness or evidence of exhaustion should be an indication to terminate the pregnancy. On the other hand the longer the fetus can be allowed to remain in the uterus with safety to the mother, the better its chances for survival. It might naturally be supposed that because of the absence of all trauma that there could be no danger to the fetus in cesarean delivery. Such is not the case. In a fairly high percentage of cases (about 3%) there occurs following delivery of an apparently lusty baby a gradually progressive weakening of respirations with blue spells and finally death.

Autopsy in these cases shows a marked atelectasis which so far has not been explained. The more premature the baby, the greater the danger of this complication.

As regards bag induction of labor, the greatest danger is the failure of the uterus to respond to the stimulation of the bag, and the fact that prolonged retention of the bag may lead to intrauterine placentitis which may cause fetal infection and death together with puerperal sepsis in the mother. Other complications are mal presentation of the fetus due to displacement of the presenting part by the bag, and prolapse of the umbilical cord following extrusion of the bag for the same reason.

Other methods of induction of labor such as quinine and castor oil, and small doses of pituitrin are not likely to be effective unless the patient is already at or near term when the uterus may be expected to respond favorably.

Primary artificial rupture of the membranes in a woman a month or two before term to induce labor is in my opinion bad judgment, since if the method fails to accomplish the objective sought, the potential infection of the uterine cavity deters the obstetrician from doing a cesarean section because of the great increase in the risk associated with operation under these circumstances.

In such a case the desirability of doing a low cervical cesarean section over the classical operation is admitted by nearly all obstetricians, and many would feel as I do that the Porro operation in which the uterus is removed just above the cervix after removal of the child is the operation of choice, since it removes all danger of blood loss from the uterus and of course eliminates the possibility of puerperal infection.

If a woman with far advanced tuberculosis is found to be pregnant and wishes to continue with her pregnancy, she should be allowed to do so in the interest of the fetus, since the outlook for the mother is frequently poor, irrespective of the pregnancy.

Williams⁷ quotes the work of Bridgman and Norwood⁸ done in his clinic in which it was found that those tuberculosis cases which had pregnancy interrupted by therapeutic abortion, did not do so well from the tuberculosis standpoint as those who were allowed to con-

tinue with their pregnancy.

Forsner⁹ of Stockholm found in 341 pregnant women who were allowed to deliver spontaneously the clinical course compared favorably with 396 who were not pregnant.

Let us now consider what conditions associated with the pregnant state might have a bad effect on tuberculous disease. Of these hyperemesis gravidarum is probably the most important. The dehydration, depletion of nutrition, starvation acidosis, avitaminosis and serious toxic neuritis and neurosis which occur in some of these cases are extreme and must have a damaging effect on any reparative process which depends largely on rest, physical and mental, and good nutrition. Fortunately, the management of this complication has improved greatly in the last few years. Bed rest, intravenous glucose, progesterone injections and Lugol's¹⁰ solution given in proper dosage before serious toxic symptoms have developed, are very efficacious in preventing their appearance. The danger of giving Lugol's solution to combat the vomiting may be open to the objection that it has a deleterious effect on the tuberculous lesions. Basic iodine without the iodized salt may well be substituted. In those cases which do not respond promptly we are inclined to advise a therapeutic abortion after a shorter therapeutic test than we would contemplate if the woman did not have tuberculosis.

The eclamptogenic toxemia rarely manifests itself as a complication until late in pregnancy, sixth month on. The nutritional disturbance is not nearly so marked as in the hyperemesis cases. They can therefore be viewed with much greater complacency as far as the tuberculosis is concerned. It is rarely necessary to put such a patient on a strict diet and even if this is necessary, it is only for a short time toward the end of the seventh and eighth months. If in such a woman pregnancy has to be interrupted the question of sterilization arises. It is my belief that if there are no other children in the family, I should advise against sterilization unless some other grounds besides the toxemia and the tuberculosis presented itself. The reason for this is that these toxemias rarely damage the kidney seriously and permanently, and that the patient is less likely to have a similar toxemia in a subsequent pregnancy. The possibility that the rise in

blood pressure accompanying this type of toxemia might complicate the situation by predisposing to hemoptysis, is not in my experience borne out by the facts.

In patients on the other hand who have a nephritic type of toxemia, the exact reverse is true. In these patients the pregnancy toxemia presents itself relatively early in the pregnancy. It frequently becomes progressively worse in spite of management. The kidneys are definitely damaged by the pregnancy and are worse in subsequent pregnancies. In such cases with the double indication for interruption and sterilization, namely, nephritis and tuberculosis, we feel that the sooner the pregnancy is terminated the better for all concerned.

When we come to the matter of delivery of the tuberculous woman, again one must individualize. A woman who has a closed quiescent lesion may be handled during labor as any other pregnant woman. It is better to use a gas anesthesia than to use ether in order to avoid unnecessary pulmonary irritation. If the second stage of labor seems to be prolonged beyond an hour, we feel that a forceps delivery is indicated if conditions are favorable to avoid unnecessary pain and exhaustion. In this connection I may say that we routinely block the perineal nerves with one per cent novocain solution with four drops of adrenalin to the ounce. This permits of delivery, spontaneous or operative, with the minimum amount of general anesthetic and the repair without any general anesthesia.

The greatest care is exercised to prevent blood loss on the assumption that conservation of blood will help the patient in her battle against tuberculosis as much as anything we can do for her. It is also of the greatest importance that a blood count be taken at frequent intervals during pregnancy to determine anemia if present and its degree. If found to be anemic early in the pregnancy, the patient should be vigorously treated for this complication. If the anemia does not develop until late in the pregnancy, preparations should be made for transfusion which includes securing of suitable, matched, Wassermann free donors who will be available at any hour of the day or night if post partum or pulmonary hemorrhage occurs. To avoid inconvenience to the donor we frequently draw the blood and put it in the ice

box in cases in which it appears likely that transfusion will be necessary. Blood may be so held for two weeks which should give ample time for the delivery to have taken place.

Cardiac complications have not been frequent in our cases. They should be treated very much the same as normal patients. If signs of decompensation appear during pregnancy the patient should be put to bed and treated to restore compensation, and then if the pregnancy has reached the stage of viability of the baby it should be terminated in the most conservative manner, which is usually induction of labor for multiparous women and termination of the second stage of labor by forceps delivery under local anesthesia as soon as the cervix is well dilated.

Diabetes associated with pregnancy and tuberculosis is extremely uncommon and has been robbed of much of its terror as an obstetrical complication since the introduction of insulin therapy. We now view these cases with equanimity where they can be kept sugar-free and our greatest concern is that after birth the baby may suffer from insulin shock brought on by hyperactivity of the fetal pancreas in utero in an attempt to supply the needs of the mother. Glucose in sufficient amount to cover the excess insulin usually is all that is required in the treatment of this complication.

Pyelitis of pregnancy with its high fever and severe anemia should receive active attention and treatment. If neglected it may result in marked weight loss and prostration. Fortunately this disease is much better understood now than previously and usually yields to proper management, including ureteral drainage by postural treatment, and urinary antiseptics. Very seldom ureteral catheterization may be necessary.

Certain pregnant women develop an idiopathic anemia which may and usually does have the characteristics of a severe secondary anemia but which in some instances gives the typical blood picture of a primary pernicious anemia. Most of these cases can be controlled by proper management, but if not the advisability of performing therapeutic abortion or inducing premature labor must be seriously considered. Fortunately the complication usually develops in the later months of pregnancy so that abortion is rarely neces-

sary. If this type of anemia is combined with a tuberculous infection the combination may be much more dangerous than either condition taken separately. The danger of even a small amount of blood loss during labor in such cases deserves serious consideration, since under the circumstances a two or three hundred cc. blood loss which ordinarily could be lost without danger may prove rapidly fatal.

When interruption of pregnancy becomes necessary because of tuberculosis or of combined indications, what procedure should be chosen and how can it best be accomplished to add the least weight to the burden the patient is already carrying?

In the first two months the problem can best be solved by pulling down the cervix, dilating the canal to the size of a 26 Hegar's dilator and packing the canal tightly with iodoform gauze. The uterus within twenty-four hours will develop uterine contractions and expell the gauze and the fetus with the minimum danger of infection and hemorrhage. If only part of the product of conception is expelled it may be necessary to curette the uterus lightly to remove the rest of the placental tissue.

If the pregnancy has advanced beyond the tenth week it is usually better to do a vaginal hysterotomy emptying the uterus with an ovum forceps, packing the cavity with gauze and repairing the incision in one operation. Both of these procedures can be very well carried out under local anesthesia with proper preoperative preparation with morphine and scopolamine. While the procedure can be carried out in primiparous women, it is much more easily accomplished in multiparae.

In cases that have advanced beyond the fourth month we feel that an abdominal hysterotomy under twilight sleep and local infiltration of the abdominal wall is the ideal method of terminating the pregnancy, and this holds for patients up to full term. In the latter group the question of whether the classical operation or low cervical operation should be done should be left to the preference of the individual operator since in elective cases of this kind the dangers of the two operations are about equal. Our own¹¹ preference would be for the low cervical operation under the circumstances since we feel in general there is apt to be slightly less

bleeding and danger of puerperal infection.

Sterilization should be carefully considered in connection with the management of each pregnancy in a tuberculous woman. Unfortunately because cesarean section furnishes easy access to the tubes for sterilization the operation is often advised chiefly for this reason. This we feel is poor obstetrical judgment. A woman who has no contraindication to deliver from below may be allowed to do so, and if desirable a small incision may be made in the anterior abdominal wall a few days after delivery, the uterus elevated with a tenaculum, the sterilization accomplished in the usual manner and the abdomen closed all under local anesthesia with no shock and practically no danger of infection, as shown by Adair¹² and his associates.

If the patient is a multipara and is in need of some gynecological repair, we usually advise her to wait a few months and then after complete involution of the uterus a vaginal approach to the tubes can be made under local anesthesia, the sterilization accomplished and the gynecological repair can be done at the same time.

In younger women and in those whose tuberculous lesion is of such a nature that the indication for sterilization is less obvious, contraceptive advice including the proper fitting of a diaphragm pessary is indicated.

Anesthesia in these patients should be limited as much as possible to local anesthesia supplemented where necessary with small amounts of ethylene, nitrous oxide, cyclopropaine or (rarely) ether. In this connection it is surprising what can be done under local infiltration anesthesia. The perineum can be infiltrated with about 10 cc. of 1 per cent novocain near the tuberosities of the ischium to block the pudendal nerve. Its branches are sought in the urogenital septum and also under the skin of the vulva around the introitus. Following this the perineum may be dilated manually, episiotomy performed and repaired. Forceps can be applied and in one case we did a version and extraction. The patient, a multipara declared that the distress caused by the version was no more severe than any other labor pain. We use 1 per cent novocain and 4 drops of adrenalin to the ounce.

We may say therefore that given a woman with tuberculosis who becomes pregnant that

there is no cause for serious concern or for precipitate action. On the contrary the case should be carefully reviewed from two standpoints, that of the internist as regards the type, extent and probable course of the disease in the immediate future, and that of the obstetrician who will estimate the possibilities of the strain on the maternal organism from the continuance of the pregnancy and the labor.

Accidental complicating factors must be evaluated by both physicians with regard to their probable influence on the tuberculous process and on the pregnancy. The decision to permit the pregnancy to proceed or to recommend its termination should only be made on the basis of facts elicited by such a survey. Under these circumstances it will very rarely be necessary to terminate pregnancy if proper facilities can be provided to safeguard the general health of the patient during gestation. This may mean continuous observation by a physician specially trained in the management of tuberculosis. It may mean sanatorium treatment for a longer or shorter period during and immediately after pregnancy. It may even mean premature delivery of the baby, termination of the pregnancy just before viability of the baby or even the performance of a therapeutic abortion. But the serious danger to the mother from the pregnancy is relatively small if these therapeutic procedures can be carried out when necessary. Given good hospital surroundings, skillful surgery performed under local anesthesia at the proper time and the risk is minimal and well worth running.

I am convinced that the gloomy picture that was painted in the text books of both medicine and obstetrics of a few decades ago, and the statistics that are still being quoted belong to an era in which both tuberculosis and obstetrics were badly mismanaged as compared with what we are prepared to do for these patients today. With the development of collapse therapy, adequate sanatorium management, local anesthesia, cesarean section and improved management of practically all the possible complications of pregnancy, it would be strange indeed if we would have to accept the same viewpoint as our predecessors. Cooperative management based on a common understanding of the underlying pathology and therapeutic pos-

sibilities by both the internist and obstetrician is the solid foundation on which the intelligent management of these interesting cases should rest.

30 North Michigan

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Early Diagnosis of Primary Neoplasms of the Lung

HARRY KONTERWITZ, M.D.
Long Island City, New York

Recent statistics place primary lung cancer at approximately 10 to 15 per cent of all carcinomas in the body. There is undoubtedly an actual increase in the true incidence of carcinoma of the lungs, although there is no real explanation for this at the present time.

Kimura in 1923 produced lung cancer experimentally in rabbits and guinea pigs by the insufflation of tar fumes through a tracheal opening. It is possible that our daily contact with tar in some form, such as the dust from tar-covered roads and fumes from incomplete combustion of gasoline and oil, is a factor.

Etiology

Age: Neoplasms of the lung may occur at any age, but is most common between the ages of 40 and 60 years.

Sex: It is interesting to note that cancer of the lung is much more common in the male than in the female, the ratio being about 5 to 1. Again we have no explanation for this.

Occupation: A review of the literature reveals that there is no relationship between occupation and carcinoma of the lung. Occupational diseases of the lung such as silicosis, do not make the individual more susceptible to primary carcinoma of the lung.

Pathology

While a primary cancer of the lung may originate in the pulmonary parenchyma, it was emphasized by Passler in 1906 that the great majority of them had their origin in the bronchi. Sacks states that in a series of 46 primary malignant tumors, the starting point was in a bronchus in forty-one cases.

Almost all bronchogenic tumors are epithelial in origin. The two most common varieties are the squamous cell and the adenocarcinoma. Bronchogenic tumors may also be divided into the medullary, basal cell, and mixed carcinomas. Some of these tumors have such a complex cellular structure that it is impossible to classify them more specifically than that they are epithelial in origin.

Clerf and Crawford state that approximately 65 per cent of lung tumors are squamous cell carcinoma. Sampson, however, reviewing the reports on 100 cases of bronchogenic carcinoma found 51 per cent were adenocarcinomas; 19 per cent undifferentiated epithelial growths; and 30 per cent were of the squamous cell type. He also found that the squamous cell tumors remained localized at their point of origin, usually growing by direct extension and involving only the adjacent lung

or mediastinal lymph glands and do not spread to distant parts of the body. In sharp contrast, the adenocarcinomas metastasize frequently and most commonly involve the central nervous system, adrenals, liver, and mediastinal and abdominal lymph glands.

Primary malignant growths may occur as a single large tumor having its origin in the root of the lung extending into the pulmonary tissue—or there may be a number of small nodules varying in size from a hazel nut to a small orange. Less commonly the lung may be studded with small nodules resembling miliary tubercles. This widespread distribution, sometimes referred to as carcinoma-tosis, is seen more frequently as a result of metastasis.

It is now recognized that in most primary cancers, the tumor is single and found projecting into the lumen of one of the larger bronchi. Instead of appearing as an isolated tumor formation, the growth may occur in an infiltrating form.

Wilson Fox describes two types of infiltration:

First, it may occur as a general infiltration in which large areas of the lung are involved. This may be uniform or here and there traces of pulmonary tissue may remain intact. The process closely resembles a dense tuberculous infiltration.

Secondly, the infiltration may radiate from the root of the lung by way of the lymphatic channels attending the bronchi. Small or large tumor nodules or masses may be seen surrounding the bronchi. In some instances, the bronchi are but little involved and the lung tissue is chiefly affected. The carcinomatous growths are of white, grayish, or grayish-yellow color, and are of firm consistency. When they occur in the lung tissue, they are apt to be softer, and may break down and empty into a bronchus thus forming a cavity. The cavity might undergo secondary infection with anaerobes and give a clinical picture resembling putrid abscess of the lung. More often the changes in the lungs consist of atelectasis in the tissue immediately around the tumor mass. Less frequently bronchopneumonia is found associated with the tumor. A pleural effusion is not uncommon—especially when the pleura is involved. Effusions which arise as the result of malignant disease, not only have a marked ten-

dency to reaccumulate after removal, but are also often hemorrhagic in character. The last feature is always suggestive of malignancy.

While there are some who believe the association of tuberculosis and malignant disease of the lungs is not infrequent, the majority of observers hold the view that the two diseases rarely coexist. Among 662 autopsies at Phipps Institute, there has been no instance in which the two diseases occurred together. The few cases reported where both tuberculosis and malignancy were present, the tumor was generally an adenocarcinoma.

Symptomatology

The size, location, type of growth and presence or absence of a secondary pyogenic infection in the lungs are the conditions responsible for the clinical symptoms of lung tumors. The most common symptoms are due to bronchial irritation such as cough, expectoration, and hemoptysis. The presence of blood in the sputum or the occurrence of small hemoptysis in an individual over 40 years old with a persistent negative sputum for tubercle bacilli should always arouse the suspicion of a primary malignancy of the lung. There is no characteristic sputum in these cases, and one should not attempt to make a diagnosis by the appearance of the sputum. Pain in the chest is a very important and an early symptom. It may be located over the tumor or radiate from the chest to the arm. It is usually an indication that the pleura is involved, either primarily or secondarily. It may arise, however, as the result of pressure. Tumors in the mediastinum may, by extending forward, give rise to pain similar to that occurring in thoracic aneurism.

Dyspnea is fairly common, especially if there is a pleural effusion complicating the tumor of the lung. Wheezing is fairly common.

Primary cancer of the lung gives rise to the same constitutional symptoms as do malignant growths in any portion of the body. The progress of the disease may be exceedingly rapid or it may be relatively slow. The duration of the disease ranges from about 4 months to 3 years. The acuteness of the disease depends to a large extent on the rate of atelectasis and the amount of pressure the mass exerts. In practically all cases, there is an irregular type of fever which may sub-

side and recur due to development of a non-specific pneumonia which clears and then recurs. Pressure symptoms are not uncommon—especially is this true of the superior sulcus tumor (Pancost Tumor)—the most common being pressure on the superior vena cava or one of its main tributaries, resulting in greatly dilated veins over the upper part of the chest.

Physical Signs

Physical signs will vary with the type and location of the tumor. If the tumor arises in a large bronchus, it may cause atelectasis of the major portion of a lobe or an entire lobe. In that case, the physical findings will be dullness and flatness over the diseased area with diminished or absent breath sounds.

Involvement of the pulmonary tissue, either primarily or secondarily, may give rise to bronchovesicular or bronchial breathing.

Not infrequently the growth becomes necrotic and as the result of disintegration gives rise to findings not unlike those found over an abscess. In these cases, the onset is acute and a diagnosis of pneumonia is sometimes made. However, the persistent findings in the chest, plus the continuance of fever, should lead to a bronchoscopy and to a conclusive diagnosis. In some cases, the physical findings are very scant. There may be diminished breath sounds with sibilant rales over the diseased area. In such cases, injection of lipiodol into the bronchial tree, followed by x-ray examination will give valuable information. At times the physical findings are that of an ordinary pleural effusion and a chest tap sometimes confirms the diagnosis. In such a case it is always wise to look for tumor cells.

Diagnosis

X-ray examination: An x-ray examination is essential in all cases of suspected malignant growths of the lung. Roentgen findings are not necessarily distinctive and a positive diagnosis is possible only by combining x-ray and clinical findings.

Formerly, the diagnosis of primary carcinoma of the lung was regarded as difficult. Two factors have eliminated some of the difficulty: First, the tremendous increase in the use of the x-rays, and secondly, the greater use of the bronchoscope. Bronchoscopy ena-

bles the examiner to obtain a direct view of the growth, provided the bronchus is large enough, and to remove a piece of the suspected tissue for histologic examination. Even when the growth is located in a small bronchus in an upper lobe and cannot be seen through the bronchoscope, the information as to the extent of the growth and the type of organism, if there is a complicating infection, is of inestimable value to the thoracic surgeon in preoperative and postoperative treatment.

Lipiodol injection into the bronchial tree is very often helpful in making a diagnosis, as the lipiodol will not be able to pass the obstruction in the bronchial tree and this puddling in the obstructed bronchus can be visualized in the x-ray; also it will be noted that no lipiodol passes below the obstruction. If lipiodol and bronchoscopy fail to establish a definite diagnosis, an artificial pneumothorax may be instituted on the diseased side, enabling the thoracic surgeon to make a thoracoscopic examination. He will thus be able to visualize the pleura and obtain a biopsy specimen which may be the means of arriving at an accurate diagnosis. Lately, a punch biopsy of the lungs has been used for making a diagnosis if the other methods have failed. There are few complications following this method and it seems fairly safe, if done properly.

Differential Diagnosis

Pleural effusion: The frequency with which malignant disease is mistaken for a pleural effusion has long been recognized. The most certain method is the use of an exploring needle. A hemorrhagic effusion while not pathognomonic is suggestive of malignant disease. Microscopic and bacteriological examination of the fluid will often help in determining the diagnosis.

Hodgkins Disease and Lymphosarcoma: Involvement of the mediastinal lymph nodes often marks the picture. The presence of enlarged lymph glands elsewhere which may be removed for histological examination will serve to differentiate them.

Pulmonary Tuberculosis: In an individual over forty years. The persistent absence of tubercle bacilli in the sputum (and providing, of course, the condition is known not to be a bronchiectasis), should lead to a bronchos-

copy where there is a suspicion of malignancy.

Chronic Inflammatory conditions of the lung are to be distinguished from malignant disease by their long duration and the absence of severe constitutional symptoms and bronchoscopic examination.

41-42 42nd Street.

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Diagnosis and Treatment of Pulmonary Tuberculosis

ROBERT H. BAKER, M.D.
Worcester, Massachusetts

An attempt will be made to discuss this subject in its entirety, briefly but as completely as possible. The treatment of pulmonary tuberculosis should cover the entire field of tuberculosis and not any one particular portion. While it would be physically impossible for any one person to be directly responsible for all of the factors that will be mentioned in the treatment of pulmonary tuberculosis, I feel that all of us should have a generalized idea of the subject. We should have a complete cycle before us regardless of whether we are medically or surgically interested. We should treat the subject progressively the same as we would teach a child to first crawl, then walk, etc. The treatment of tuberculosis begins with case finding and ends with rehabilitation.

Case Finding

Large sums of money have been spent in routine school examinations, i.e., skin tests and x-rays. The cost of finding each case of pulmonary tuberculosis in school children has been estimated as between \$1,000 to \$1,500. School examinations should be encouraged in communities financially able to support such a program. Where finances are limited then a strong attempt should be made to have all known contacts examined.

Contacts

As soon as a diagnosis of tuberculosis has been made every effort should be made to

examine each member of the family, especially a chest x-ray and sputum examination if possible, and any other persons with whom the patient has been in close contact. In this way a higher portion of positive cases will be found, treatment can begin early, contacts broken, and the spread of the disease limited. Much difficulty is often encountered in having a whole family examined. Many persons feel it is a disgrace to have tuberculosis and do not want other relatives and friends to know they or one of their relatives have this disease. Many times a contact will say, "There is nothing wrong with me, I never cough, etc." Many do not want to know whether they are infected or not.

When the diagnosis of tuberculosis is made in a clinic the family physician should be immediately notified and a complete record of the case sent to him with any recommendations indicated. There should at all times be the closest co-operation between the clinic and family physician. Each can be of great help in many ways to the other. A good social service will eliminate all persons attending the clinic except those who are financially unable to pay for an x-ray or physical examination. In this way there will be better co-operation between all concerned. Family physicians should be advised of the course their patients are following after admission to a sanatorium and invited to visit the institution frequently. Thus, a broader knowledge of the physician's problem and the sanator-

ium's problem will be understood. By doing this the family physician, sanatorium and patient will benefit immeasurably.

Tuberculosis is still a major public-health problem in Massachusetts and in 1939, with 1602 deaths, ranked seventh as a cause of death; but this number of deaths, large as it is, does not serve to measure the full significance of the disease.

Tuberculosis is the leading cause of death in this State at the most productive period of life. More persons between nineteen and thirty-five years of age succumbed from tuberculosis than from any other single cause in 1938. The death rate from the pulmonary form of the disease in this age group rises to about 40 per 100,000 population and tends to rise still higher in the remaining years of life.

The relative importance of the pulmonary form of the disease is increasing and that of the extrapulmonary form diminishing. In 1921, deaths from pulmonary tuberculosis comprised about 83 per cent and those from extrapulmonary forms about 17 per cent. In 1939, the figures were 94 and 6 per cent respectively. Though extrapulmonary tuberculosis is frequently secondary to pulmonary lesions, infected milk is a factor. Elimination of the disease in cattle and pasteurization of milk are largely responsible for the diminishing proportion of deaths from extrapulmonary tuberculosis. To eliminate the chance of human infection from tubercle bacilli or other organisms in milk, all milk should be pasteurized.

The spread of tuberculosis is more readily prevented in institutions than in the home, and it is of interest to note that in 1938 about 80 per cent of the deaths from the disease occurred in institutions and only about 20 per cent in the home. For the benefit of the individual, and the protection of the family and the community, patients with tuberculosis should be urged to go to institutions.

The degree to which tuberculosis is a menace is not the same in all counties. In general, those counties having the highest density of population have the highest death rates.

Churchill states the problem very clearly when he says, "The goal in the therapy of pulmonary tuberculosis is the conversion of a positive sputum to one that is free of the

tubercle bacillus. This requires the obliteration of cavities; and collapse therapy, either with artificial pneumothorax or by surgical measures, is largely concerned with the closure of cavities."

Collapse therapy is fortunately no longer on trial, but public institutions are from time to time obliged to show justification for the additional expense necessary to maintain an adequate surgical program. Until the advent of collapse therapy in the treatment of pulmonary tuberculosis many patients received only bed rest, fresh air, and good food. We still consider these of the greatest importance. However, in many cases this type of treatment alone is not sufficient.

Collapse Therapy

Collapse therapy is the only important addition to the treatment of pulmonary tuberculosis since the sanatorium was introduced more than fifty years ago. This form of treatment offers the majority of tuberculous patients the chance of defeating this disease. However, many cases of tuberculosis have been cured by sanatorium care alone. Also, the sanatorium is as necessary to the success of surgery as surgery is to the sanatorium. They are inseparable in the modern effective treatment of tuberculosis.

As recently as fifteen years ago surgery was occasionally used by only a few physicians. At the present time it is used by most sanatoriums in from 35 to 80 per cent of the cases. The combination of sanatorium care and surgery is very important since tuberculosis never seems as serious as it is to the family or patient.

Surgical operations in the treatment of pulmonary tuberculosis endeavor to accomplish rest, immobilization and compression of the lung. When successful they accomplish only what nature's efforts have attempted. It is an old observation that patients with chronic fibroid tuberculosis reveal a diminution in size and a relative immobility of the corresponding side of the thorax. The diminution in the size of the hemithorax is due to a narrowing of the intercostal space, often with overriding of the ribs, an elevation or a relative immobility of the diaphragm and a displacement of the mediastinal structures over the affected side. Therefore, the surgical treatment of pulmonary tuberculosis plays

an important part in the treatment of tuberculosis in aiding nature's efforts. In addition to the rest, immobilization and compression provided, other important effects are produced, such as alteration of the blood and lymph circulations of the diseased lung with the result that the general intoxication of the body is diminished and the healing of local lesions is facilitated.

Pneumothorax

Pneumothorax is the most vital contribution to the treatment of pulmonary tuberculosis since 1870. It was first suggested by James Carson of Liverpool in 1820 but did not receive serious attention until 1882 when advocated by Forlanini. Some of the purposes of this form of treatment are:

1. Augments existing tendencies to shrinkage.
2. Approximates walls of cavity.
3. Prevents extension of Tuberculous process along the lymph and bronchial channels.
4. Facilitates and augments expectoration.
5. Proliferation of connective tissue.
6. Tends to change an exudative process into a productive process.

Pneumolysis

Unfortunately, in the majority of cases pleuritic adhesions prevent satisfactory collapse or closure of the cavity and it becomes necessary to sever these adhesions with a cautery or other methods of choice of the operator. About 40 per cent of cases of pneumothorax are unsatisfactory due to these adhesions which are most often distributed over the more diseased parts of the lung. All of us are impressed with the advisability of converting an unsatisfactory pneumothorax into a satisfactory one, hence this operation.

Operation on the Phrenic Nerve

A large number of surgeons now feel that phrenic crushing producing a temporary paralysis of the phrenic nerve for a period of a few months is the operation of choice rather than phrenicectomy or evulsion. Purpose of the operation is to paralyze the leaf of the diaphragm. As a result an additional amount of rest is accomplished because of the diminution of the respiratory excursion. Paralyzing the diaphragm also relaxes the lung and

forces it upward, and increases pressure on the lung helping cavity to close by relaxing adhesions. It also produces alterations in blood and lymph flow. Phrenic operations have failed to justify the expectations of many. However, it has a definite place especially in basal lesions, unsatisfactory pneumothorax and early lesions. Also in conjunction with pneumothorax and preparatory to thoracoplasty.

Oleothorax

Antiseptic oil first used by Berson in 1922. This form of treatment has been praised by some and condemned by others. In many sections of this country this form of treatment is condemned. However, many men have reported favorable results and are quite enthusiastic as to its value. I feel that many failures are due to improper technique, selection of cases and lack of experience. Oleothorax requires more skill, keener judgment and proper selection of cases than other forms of collapse.

The chief uses of oleothorax are:

1. As disinfection, also for treatment of pneumothorax empyema.
2. As an inhibition oleo to inhibit expansion of lung in cases wherein a satisfactory pneumothorax cannot be maintained.
3. As a compression pneumothorax.
4. Mixed infections.

Gomenol which is used a great deal is derived from leaves of a tree belonging to the Myrtle tree family. Paraffin or olive oil may be used as a base. The best method to follow is usually to use 20 cc. of a 5 per cent solution in order to first test the sensitivity of the pleura, gastric upsets, prevention of fistula, etc.

I realize that a great many men do not advocate the use of oleothorax. Also, that some of the results have been very unsatisfactory. However, I will soon present approximately one hundred cases of successful oleothorax cases before the Trudeau Society of Boston. Complications in these cases have been few. A large number of these patients will present pneumothorax on one side and oleothorax on the opposite. One case will be oleothorax on one side followed by thoracoplasty on the opposite. I will not attempt to go into this subject more thoroughly at

this time, but would like to add that I am enthusiastic about this form of treatment, this enthusiasm being justified by the results obtained.

Thoracoplasty

The first attempt to close a lung cavity by the removal of the overlying ribs was made in 1885. As a rule this operation is performed when pneumothorax or other forms of collapse have proved unsuccessful or unsatisfactory. In the early days radical operations were done with removal of several ribs, usually five to ten. This technique has been changed considerably and much better results are being obtained. Larger sections of the ribs are being removed and a complete operation now usually requires but two stages, this being due to extra pleural and fascial apicolysis. We are now leaving the 1st rib when possible. Also, we have in our records two cases of bilateral thoracoplasty, one patient having had the first three ribs removed from each side and the other patient having seven ribs removed from one side and three on the opposite.

Plombage

I have tried this method of collapse in about fifteen cases, all of which have been far advanced, usually bilateral in which no other form of collapse could be obtained or was indicated. Considering the seriousness of each case the results have been encouraging. Out of this number there have been two cases in which the paraffin has ruptured into the cavity and the patients have spit up small pieces of paraffin (this occurred several months after the operation). When this first occurred removal of the paraffin was advised and refused by the patients. One patient later died with a massive spread of the disease to the opposite lung. The other patient now has a satisfactory pneumothorax on the opposite side but refuses to enter the hospital for removal of the paraffin.

Extrapleural Pneumothorax

So much has been written on this subject that it is not necessary for further comment. My experience with this form of collapse therapy has been rather discouraging. Of the two operations, I much prefer plombage to extrapleural pneumothorax. Other surgical meth-

ods have at times been advocated but I have only attempted to mention the most common used.

Rehabilitation

To me, this is one of the most important aspects in the treatment of tuberculosis. Many of us are inclined not to think what the patients will do when they leave the sanatorium, how they will live, the difficulties of readjustment, and the means of earning a livelihood. We attempt at this institution, when the patient's condition warrants, to place them in training for some desirable position suitable to their condition in order that they may become self-supporting. Since tuberculosis is not a respecter of race, person, or position, it is sometimes quite difficult to place these people in some gainful occupation. Many employers still do not want a former tuberculous patient working for them because of the fear of this disease. I would much prefer to work with a person who has had tuberculosis and is apparently arrested, and knows how to take care of himself and protect his fellow men than to work with someone who has the disease and does not know it. Disability from this disease requires more care and careful scrutiny than any other type of disability.

In giving a tuberculous person vocational guidance it is first necessary to give a medical report showing that such person is an apparently arrested case and is in such condition that he or she is physically capable of performing a normal day's work. Each person presents an entirely different problem and must be handled as such. The age, height, and weight must all be given due consideration. In the case of pulmonary tuberculosis whether it is bilateral or unilateral must also be considered. Whether the person is receiving pneumothorax or has had a thoracoplasty performed also has its bearing. The home environment and the persons own ability to readjust himself must be checked very carefully. All these factors must be carefully scrutinized individually and the results put together as a whole before a plan of rehabilitation can be put into operation. Once a decision has been made as to the vocation a man is physically capable of performing a training program may be arranged under careful supervision. The person is checked in

his course at least once a month in order to observe the progress that is being made and to give any further suggestions if needed. When the training course is completed the problem of obtaining employment presents a new picture which must be handled with care.

The main problem is the person's ability to adjust himself anew, and the first and most important thing is obtaining employment in a locality where the environment is such as to reasonably preclude another breakdown. This must be accomplished both from the standpoint of work environment and home surroundings, because it is a well known fact that even though a person's working surroundings would be such as to normally preclude a flaring up of an arrested condition the home surroundings might be such as to react adversely, or vice versa. Once suitable arrangements have been made in these two respects the next consideration is proper medical care afterwards. It may be that the tuberculous person needs pneumothorax bi-weekly or monthly. The rehabilitation section outlines the entire situation to the prospective employer in order to avert any pos-

sible disturbance of the moral of other employees.

Generally speaking, my experience has been that employers as a whole, after the first natural resistance to the employment of a tuberculous person has been broken down, can be made to see that under the proper surroundings and with a hand picked job that such a person can do as good, and quite frequently a better job, than a person who is physically perfect.

Summary

1. We should all have some knowledge of public health problems involved in the spread and early diagnosis of pulmonary tuberculosis.
2. Indications and complications of collapse therapy have not been discussed.
3. The main object in the treatment is to convert a positive sputum into a negative sputum.
4. Only a general description of surgical managements have been attempted.
5. I attempted to only briefly discuss the problem of tuberculosis.

Belmont Hospital.

The Monaldi Procedure—A Progress Note*

EDWARD KUPKA, M.D.
Los Angeles, California

This presentation consists of two parts: the first based upon our experience with cavity aspiration and the second a summary of Dr. Monaldi's own results with his procedure.

Our experience in Los Angeles comprises more than thirty cases. It is our intention to review here the first seventeen patients, operated between September 1939 and April 1940. These were originally reported a year ago before the American Trudeau Society. The series comprises three Caucasian men and fourteen women, of whom three were Mexican, two Negro, and nine Caucasian, aged seventeen to fifty-one. All of the cavities were in the upper lung, ten on the right and seven on the left, and varied in size from 4x5 cm. to 10x16 cm. They were punctured anteriorly by the standard Monaldi technique,

and suction was exerted through a rubber catheter by a two-bottle pump. The duration of suction was two months to twelve months. The period of time since each patient was placed under aspiration varies from fifteen to twenty-one months and now allows a more significant perspective than before.

The cavities of three patients were closed by the treatment. One patient, however, developed a second cavity in the lower part of the same lobe during the suction, and subsequent thoracoplasty failed to close this second cavity, although the sputum has remained negative. In one who closed a cavity 10x16 cm. in size with dramatic disappearance of symptoms, it was felt that a thoracoplasty should be done at once for fear of reopening, but unfortunately the cavity reappeared (as a small slit, 1x2 cm.) after the thoracoplasty was started, although this spu-

* Read before the meeting of the American College of Chest Physicians, Cleveland, May 31, 1941.

tum also remains negative. The third, our one completely satisfactory case has been at home for several months with arrested disease, the cavity having remained closed for sixteen months.

In five other cases the cavity closed completely, as confirmed by repeated planigraphic investigation, with conversion of sputum in every case. In all five the cavity later reopened gradually after the catheter was removed, usually to only a slight extent, however, and with the reopening of the cavity the sputum again became positive in three. One had thoracoplasty with closure of cavity, but sputum failed to become negative; proved coexistent tracheo-bronchitis may be responsible for continuing excretion of bacilli. One is having a thoracoplasty now, and two refused thoracoplasty. Both of the latter left the sanatorium against advice and after six months at home, each still has a small cavity but sputum remains negative, and patients are in excellent condition. This is the type of case which accounts for many of Dr. Monaldi's "good results".

One cavity was reduced from 4x5 cm. to $\frac{1}{2}$ x2 cm., and the sputum became negative and remained so; the patient then received one stage of a thoracoplasty; the cavity remained closed and additional surgery was not necessary. Another cavity was reduced from 9x5 cm. to 1x3 cm., and sputum was converted; after suction was discontinued, sputum again became positive and one stage of a thoracoplasty was done; the patient then left the sanatorium against advice. In another patient a 5x9 cm. cavity encased in an atelectatic caseous lobe became closed, but when suction was discontinued the cavity blew up to its original size very quickly. His sputum became negative during cavity closure, then positive again as cavity reopened. He is to have a thoracoplasty in the near future.

Thus five have already received, and two refused, thoracoplasty. Of these seven, in five the rib operation would have been impossible without suction because originally their disease was too extensive or their condition too poor to permit operation. Two others would have been fair risks, and these were the two who ultimately refused thoracoplasty.

One patient had two giant cavities, 8x15 and 5x8 cm., on the same side, occupying most of the lung area. The upper one was aspirated

for many months with but slight decrease in size, and the sputum remained positive. There was marked relief of the distressing cough during suction, but the patient was, and still is, a poor thoracoplasty risk. Another had a hemorrhagic diathesis, in spite of which aspiration was begun. In the fourth month repeated episodes of moderate hemoptysis began, and blood was aspirated regularly through the catheter, so treatment was discontinued. The cavity reduced from 4x6 to 1x4 cm. and then blew up to its original size. Another patient accidentally pulled out her catheter, and within the past year was re-punctured; she is the only one of this series still under suction. Her cavity has reduced from 5x7 to 1x3 cm.

Four of the patients died. In the youngest of the series, a Mexican and our first case, a 6x7 cm. cavity closed in three months, but after the catheter had extruded, the cavity reopened to 3x2 cm., and three months after cessation of suction, tuberculous meningitis developed. In the second, a negress, the cavity was reduced from 5x6 to 2x3 cm., but after two months the patient began to decline rapidly with intestinal tuberculosis, and died of mixed infection peritonitis following rupture of the ileum. The indications for puncture were favorable in both. The other two fatal cases were desperately ill at time of puncture, and died of continuing extension of pulmonary disease with intestinal tuberculosis, although the treated cavities reduced in size from 5x7 to 2x5 cm. and from 5x7 to 2x2 cm.

In this series of cases, taken as a whole, reduction in size of cavity was the rule, and closure of cavity of some duration, took place quite frequently. The average size of cavity in the seventeen patients was 6x8 cm. Eight cavities closed during suction; five of these reopened after suction was discontinued to an average size of 2x4 cm. Seven cavities failed to close but reduced to an average of 4x5 cm. Sputum conversion likewise took place as cavities closed and sputum continued negative after reopening of cavities in some. In others there was a marked reduction in the positivity of the sputum. Sputum decreased in amount, and the transformation of cavity material from purulent to serous occurred usually. Increase in appetite and weight was the rule.

Among complications directly attributable to the procedure there was one instance of post-puncture hemoptysis of moderate degree, and three chest wall fistulae—two healed slowly instead of rapidly which is the rule, and one persists. In three cases a fresh infiltration occurred during suction, but disappeared later; two of the fatal cases had widespread progressive increase of disease.

From this small personal series we now shift to the wide experience of Monaldi and his associates at Rome, where this technique had its origin. The data which follows was published at the end of 1940 in a special issue of the *Annals of the Forlanini Institute* and covers 330 cases done between July 1938 and October 1940.

Monaldi does not use the term "cured" because of the short time of observation (up to two years), and because of the presence in some cases of other unhealed tuberculous lesions besides the treated cavity. A favorable result in his judgment consists in satisfactory general condition, lack of evidences of toxemia, conversion of sputum, and either closure of cavity or its reduction to a small slit. It must be particularly noted that he does not demand complete cavity closure.

Of the total of 330 cases Monaldi considered that 140 had "favorable" results according to the above criteria. Fifty-nine of these had isolated cavity, 41 had a cavity surrounded by slight pathological tissue. Nineteen had extensive non-excavating lesions accompanying a single cavity, and 22 had more than one cavity. Under this classification, isolated cavity gave the best results. Most of the patients had taken the rest cure for a long time and were those in whom collapse therapy had failed or could not be done.

When two cavities were present in the same lung, it was noted that when they were in direct contact, the second cavity closed with the first, indicating a connection. If the cavities were close but not touching, the second cavity at first became larger and later closed after a layer of expanded lung had developed between the two. If the cavities were at greater distance, there was no effect upon the second cavity. Sometimes new cavities tended to open at some distance from the one being aspirated.

In regard to bacterial studies, Monaldi believes that the catheter itself becomes in-

fectured and may be the cause of continuing positive secretion. He suggests a rather frequent change of catheter through the same tract, a procedure which we found difficult. Symptomatic improvement usually took place as the thick purulent infected secretion changed to a thin serous secretion with few or no bacilli. Thus the lessened toxemia corresponded with lessening pathological products within the cavity, rather than with lessened cavity size.

During the first week or two after puncture, an irregular fever was usually present with an increasing sedimentation rate and increasing symptoms. These signs and symptoms gradually disappeared and a marked improvement followed, even though the cavity remained open. Pyogenic infection of the catheter tract, frequent but never serious, brought about short bouts of fever.

Extensive studies were carried out with visualization of the cavity and its drainage bronchi by means of iodized oil. This medium was injected without fear through the catheter into the cavity, and then the patient was instructed to cough or take deep breaths to help the oil get into the bronchi. One hundred patients were examined in this way, many of these more than once. A very few cavities showed no draining bronchi from the beginning, and a few showed multiple bronchi. Usually there was one visualized bronchus, sometimes opening in a valve-like fashion, with a diameter which varied widely. Closure of bronchus seemed essential for success in closing the cavity. Bronchial obliteration usually took place by progressive annular stenosis commonly near the cavity, sometimes at a distance, rarely by linear stenosis, or a progressive reduction of caliber throughout its length. Persisting evidence of open bronchus was seen in cavities which failed to close completely.

Though Monaldi at first believed that areas of exudation present at time of puncture tended to disappear during suction, this longer series indicated that during suction, new and quite large densities appeared around the cavity, to disappear later during suction. Too high a degree of suction may be one of the causes.

In the matter of technique, Monaldi believes that the exploratory needle causes more post-puncture hemoptyses than the

trocar. The two bottle pump is still considered the most satisfactory type because the pressure is variable and allows frequent recovery of tissue from the effects of suction. Long-continued pressure at a high unchanging level may bring about dangerous changes in the small blood vessels in the tissue immediately about a cavity. At all times care must be taken that the catheter tip is in an effective position. When suction is not being applied, the external end of the catheter should merely be covered with gauze, not clamped, to avoid positive pressure within the cavity during cough. Treatment should not be abandoned while the cavity secretion is still purulent, and sometimes it takes many weeks for it to become serous.

In older patients attacks of paroxysmal dyspnea may take place because of too high pressures, especially when cirrhotic lung, mediastinal deviation, and hemithoracic retraction are present. Suction must then be discontinued for awhile and then recommenced cautiously. Ten hours should be the average daily period of suction, and 15 to 30 centimeters of water the average degree of negative pressure. When the draining bronchus fails to close, near the end of treatment, suction should be made continuous day and night and persisted in for a prolonged period. Even after the bronchus seems closed, the catheter should be left in the chest for a few more weeks and daily syringe suction be made before final removal.

Three of the patients who were doing well with cavity suction but who died of unrelated causes were examined at the autopsy table. There was noted cleansing of the cavity wall, a tendency of the draining bronchus to obliterate by means of proliferating endobronchitis, and evidence that the catheter tract seemed to create its own wall. The tissue immediately about the residual cavity showed dilatation of the small blood vessels, and infiltration with lymphocytes and histiocytes, while surrounding as well as more distant parenchyma showed alveolar distention.

At the time of this report 102 of the 330 patients were still under treatment, and five had left the institution with suction in progress. Adding the 140 who finished treatment successfully, there were 83 left in whom the treatment was unsuccessful. In this group, three died of acute disease: eclampsia, septic

peritonitis, and pulmonary infarct. Three died of hemoptysis coming from another source than the treated cavity. Two died of unknown causes, one at the time of puncture and another during adjustment of the catheter at a later date. One died of bronchopneumonia following hemorrhage. One died of hemoptysis following posterior puncture, coming from the treated cavity, and one died of septic empyema following puncture into an unobliterated pleural space. In eleven the catheter slipped out prematurely. Four were repunctured, the rest are to be repunctured. Twelve were unsuccessful because of technical inexperience of the operators. Three developed tuberculous empyema. Three developed pleural effusion. In one patient homolateral spontaneous pneumothorax took place some time after puncture. Repeated hemorrhage caused abandonment of treatment in one case. Many of the remainder died of progressive pulmonary tuberculosis. In this group were twenty done for symptomatic reasons, and some from the early days of the research, when the procedure was done only on hopeless patients.

Dr. Monaldi's conclusion to the section on complications is as follows: "Experience, assiduous vigilance, exact knowledge of the morbid picture, frequent x-ray check, serial examination of the sputum and the cavity fluid, satisfactory position of the catheter, and replacement when necessary, adjustment of the intensity and duration of cavity suction according to individual tolerance are factors which permit the avoidance of complications and assure the attainment of the best results."

Conclusions

In most cases subjected to the Monaldi procedure a decrease in the size of cavity to a varying degree, reduction of sputum, and clinical improvement may be expected to take place.

In many cases the cavity ceases to be visualized roentgenologically, and sputum becomes negative, but frequently the cavity reopens after the suction has been discontinued.

Closure of bronchus seems essential for closure of cavity by this means.

Cavities remain closed in a small fraction of cases.

What the ultimate fate will be of those

cases where the cavity has reopened slightly and the sputum remains negative cannot be estimated at present, but it may be assumed that open cavity is dangerous, even with a negative sputum. Monaldi included these among his favorable results; we consider them as failures.

As an ancillary operation with thoracoplasty and as a measure for symptomatic relief, cavity aspiration deserves a place among the surgical measures used in the treatment of tuberculous cavity. As a solo procedure, its importance is still in doubt.

An Evaluation of Tuberculin Tests and Correlating Roentgenograms*

PAUL D. CRIMM, M.D.
Evansville, Indiana

Three thousand five hundred and fifty-nine (3,559) individuals were tested with two strengths of tuberculin and examined by x-ray. Their ages ranged from one to seventy years, the majority being between ten and twenty years. Variations of incidence in different age groups were noted. The incidence of infection is compared with the morbidity and mortality rates in this geographical location (100,000 population). Altogether 19,000 individuals were tuberculin tested, and the majority of the positive reactors were x-rayed. This detailed study of 3,559 individuals was done primarily to determine the number of those anergic to diagnostic doses of tuberculin.

Method

The Purified Protein Derivative (P.P.D.) and Old Tuberculin (O.T.) used in these tests was manufactured by the same company (Mulford). O.T. in two strengths (0.1 Mg. and 1.0 Mg.) and P.P.D. in three strengths (0.00002, 0.001 and 0.005 Mg.) were administered to 2,003 individuals,^{1,2} whereas 1,556 students received 0.001 Mg. of P.P.D. and the Patch test (Lederle).³ The Patch test was read seven days after application and the Mantoux tests were read in 48 hours. Comparisons were made on the relative efficiency of the tuberculins.^{1,2,3} All roentgenograms were interpreted, according to accepted standards, without knowledge of the tuberculin reactions. The primary complex as demonstrated by the presence of calcification, by one or more nodules, was considered pathognomonic.^{4,5} Calcified nodules, which might

be questionable or interpreted as non-tuberculous foci⁶ of calcium density, were not included.

Results

Of the 19,000 individuals tested with tuberculin, 1,432 industrial workers were tested with 0.1 Mg. of O.T. Positive reactions were noted in 31.0 per cent. In the same age group, when 1,188 industrial workers were tested with 1.0 Mg. of O.T., or 0.001 Mg. of P.P.D., an incidence of 51.0 per cent was obtained. Thus, the reliability of skin testing, in discovering the incidence of infection, depends upon, or varies with the strength of the diagnostic dose.

In this study, the 3,559 individuals who were tested with tuberculin and examined by x-ray, had an incidence of infection of 48.0 per cent (1,720). Thirty-two per cent (1,138) gave a positive reaction to tuberculin, while 33.0 per cent (1,187) had positive findings. Seventeen per cent (615), who were positive to tuberculin, also had positive x-ray findings. Fifteen per cent (523) were positive to tuberculin and negative to x-ray, while 16.0 per cent (572) were negative to tuberculin and positive to x-ray (Chart I). The percentage of error for both the tuberculin test and x-ray, as a means of infection finding, is practically the same.

The incidence of infection is shown in Graph I for different age groups. The incidence naturally increases with the age of the individual. The graph also shows the incidence of infection to be greater when both tuberculin and the x-ray is employed, than when one or the other is used alone. A general trend between the ages of 10 and 40

* From Boehne Tuberculosis Hospital, Evansville, Indiana.

years, in favor of the x-ray over the tuberculin test in infection finding, is demonstrated. The graph also demonstrates those positive to either or both tuberculin and x-ray and the negative reactors. There are less negative reactors in the older age groups, but the limited number of individuals tested beyond the age of 40 must be taken into consideration. Graph I also demonstrates those positive to tuberculin and negative to x-ray, and those who were negative to tuberculin and positive to x-ray. The number of those who were anergic to tuberculin and positive to x-ray is greater between the ages of 10 to 30 years. Due to the fact that more were tested and x-rayed in this age group, the foregoing statement is made with reservation.

Of the 19,000 individuals, 12,353 high school students had an incidence of infection of 18.0 per cent using O.T. 1.0 Mg. Among the 3,559 individuals in this study, having an incidence of 48.0 per cent infection, was a group of 1,003 individuals, most of whom were adolescents. An incidence of 30.0 per cent infection was discovered. X-ray examination of the same group increased the incidence to 48.0 per cent. Likewise, a group of 1,000 individuals, most of whom were between 20 and 30 years of age, had an incidence of 51.0 per cent infection with tuberculin, but x-ray examination increased the incidence to 72.6 per cent. Of the 3,559 individuals, a group of 1,556 high school freshmen had an incidence of infection of 16.7 per cent with tuberculin. Radiological examination added 13.9 per cent, making a total incidence of 29.9 per cent. Therefore, the 12,353 high school students

who were tested over a period of eight years, and who had an incidence of 18.0 per cent, as far as the tuberculin test is concerned, would have had an estimated 30.0 per cent infection had x-ray examination been added to the entire group.

Discussion

It is still difficult for some investigators to believe that the tuberculin test does not find all individuals who have been infected with tuberculosis. Most surveys are concerned with the x-ray examination of only positive reactors, to determine the extent and character of the infection, if pulmonary. However, in this series of cases, 16.0 per cent were positive to x-ray and negative to tuberculin. These individuals would have been overlooked in any survey which did not include radiological examination. In the author's opinion, the radiological examination in mass testing is of greater value than the tuberculin test, if a preference is required. Myers⁷ states, "the student who reacts to tuberculin, but in whom no lesion can be detected, may at any subsequent time have chronic clinical tuberculosis." Pinner⁸ counters with the question, "But, is not exactly the same statement true for the student who does not react to tuberculin?" If the lesion is located in the parenchymal tissue of the lung, it is potentially more serious than the non-parenchymal lesion, even though the latter be masked or hidden. However, if the opinion is considered that the positive reactor, although clinically inactive, is more likely to break down with tuberculosis than the negative reactor, the

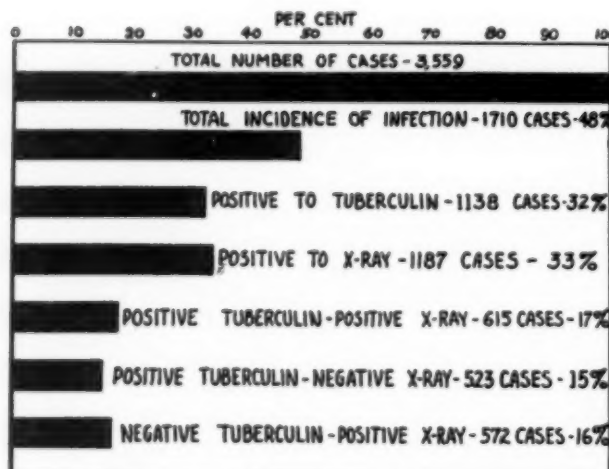
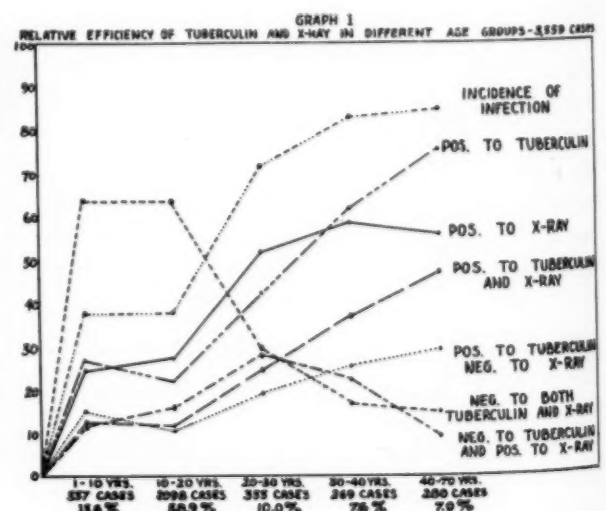


CHART 1 - TUBERCULOSIS STUDY OF 3,559 INDIVIDUALS



tuberculin test is probably more significant than the x-ray examination. The same concern should be given to the anergic individual, because he might react to stronger doses of tuberculin, even though he does not react to diagnostic dosages. On the other hand, if a primary or a healed secondary infection conveys a relative immunity, or increases the resistance of the individual to tuberculosis, the negative reactor should give us more concern when he encounters his primary infection than the positive reactor who has already weathered his primary, or primary and secondary infection.

Mass tuberculin testing of an entire group and x-ray examination of the positive reactors is a most valuable project, as far as educating the public concerning the prevention and cure of tuberculosis. It is certainly more economical than the mass testing of all individuals by radiological examination. A conservative estimate of the cost of tuberculin testing and x-raying the 3,559 individuals in this study, would be approximately \$5 per individual, or a total of \$17,795. The relative yield of open cases of tuberculosis alone does not warrant this expenditure of money for mass testing and x-ray. On the other hand, one cannot estimate the relative yield contributed to the education of the general public.

In this group of 3,559 individuals, 45.0 per cent were found to have primary infection, 3.3 per cent secondary infection, and 0.05 per cent were found to have active disease. In the 12,353 high school students, who were examined over a period of eight years, 0.1 per cent were found to have active pulmonary tuberculosis.

In this locality the death rate was 54.3 per 100,000 population for 1940. For the past five years the death rate has averaged 70.6. The morbidity rate for the past five years has averaged about 170 active cases of tuberculosis per annum. Since excellent cooperation is received from the Medical Society and Welfare Agencies, it is generous to estimate that not more than 30 open cases of tuberculosis were not reported. An outside estimate on morbidity, therefore, would be 200 cases per annum. The National Tuberculosis Association estimates that there are about eight or nine open cases for every death. If this estimate were used in our locality, it would be

erroneous, since three or four cases for every death is apparently more accurate. According to our survey, using the tuberculin test and x-ray, the incidence of infection is 48.0 per cent. This includes all age groups, whereas if just adults were tested the incidence would increase to 72.6 per cent. On a percentage basis, about one-half of the population (100,000) is infected with the germs of tuberculosis. According to the death rate, only 0.07 per cent are dying annually from tuberculosis, with only 0.2 per cent breaking down annually with active pulmonary tuberculosis. These figures, therefore, suggest that the people in this locality may have developed a relative immunity, or, if you please, have an extremely good resistance to the so called "White Plague".

Summary

1. Of the 3,559 individuals who were tested with diagnostic doses of tuberculin and examined by x-ray, 48.0 per cent were found to be infected with tuberculosis.

2. If the tuberculin test alone were employed, the incidence would be 32.0 per cent infection. If the x-ray were the only medium of finding infection, the incidence would be 33.0 per cent. The incidence, according to x-ray and tuberculin, in different age groups was noted.

3. Sixteen (16.0) per cent were anergic to diagnostic doses of tuberculin, while 15.0 per cent were positive to tuberculin and had either masked or non-pulmonary lesions.

4. In this locality, if 48.0 per cent of the population (100,000) are infected with the germs of tuberculosis, with a mortality rate of 0.07 per cent and a morbidity rate of 0.01 per cent, the suggestion is made that they possess a relative immunity to the "White Plague".

Boehne Tuberculosis Hospital

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Organization News

Southwestern States Chapter Meeting

The Southwestern Chapter of the American College of Chest Physicians will have a one-day meeting Wednesday, November 19, 1941, one day preceding the Southwestern Medical Society Convention on November 20, 21 and 22, 1941. This arrangement enables physicians to attend both meetings on a single trip. The following program has been arranged:

Program

Southwestern Chapter of the American College of Chest Physicians

- 9:30 A. M. *The Management of Pleural Effusion in Artificial Pneumothorax*
By Dr. Fred G. Holmes, Phoenix, Ariz.
Discussion opened by Dr. Leroy S. Peters, Albuquerque, N. M.
- 10:15 A. M. *Thoracic Tumors (followed by motion picture in technicolor showing the removal of intrathoracic teratoma)*
By Dr. Frank S. Dolley, Los Angeles, California.
Discussion by Dr. C. A. Thomas, Tucson, Arizona, and
Dr. Hilton J. McKeown, Phoenix, Arizona.
- 11:15 A. M. *Pulmonary Coccidioido-Mycosis*
By Dr. O. J. Farness, Tucson, Arizona, and
Dr. C. W. Mills, Tucson, Arizona.
Discussion by Dr. C. W. Mills, Tucson, Arizona.
- 12:30 P. M. *Round Table Luncheon With Diagnosis of Unusual X-ray Films*
By Dr. Frank S. Dolley, Los Angeles, California.
Dr. W. Warner Watkins, Phoenix, Arizona.
Dr. Edwards Hayden, Tucson, Arizona.
Dr. Leroy S. Peters, Albuquerque, N. M.

2:00 P. M. Some Therapeutic Uses of the Bronchoscope

By Dr. Thomas H. Bate, Phoenix, Arizona.
Discussion by Dr. John Mikell, Tucson, Arizona.

2:45 P. M. Extrapleural Pneumothorax (Its Present Status in Treatment of Pulmonary Tuberculosis)

By Dr. Frank S. Dolley, Los Angeles, California.

Discussion by Dr. Victor S. Randolph, Phoenix, Arizona.

3:30 P. M. Psysiology and Pathology of Atelectasis

By Dr. Orville Egbert, El Paso, Texas, and
Dr. Robert B. Homan, Jr., El Paso, Texas.
Discussion by Dr. Robert O. Brown and
Dr. Frank Mora, Santa Fe, N. M.

4:00 P. M. Business Meeting

6:30 P. M. Dinner Followed by Talk on Aviation Medicine

By Army Aviation Surgeon (Name to be announced later)

The round table luncheon is to be an x-ray "Information Please." A brief resume of the history, physical examination and laboratory work will be read and the x-ray submitted to the diagnostic group for opinions. Ten to twelve films difficult to diagnose will be presented. This meeting is open to all members of the Southwestern Medical Association whether or not they are fellows of the American College of Chest Physicians. Southwestern physicians are urged to attend this well balanced program.

For further information, address Charles S. Kibler, Regent, American College of Chest Physicians, Tucson, Arizona.

Dr. Hayes—Guest Speaker

Dr. E. W. Hayes, Monrovia, California, Past President of the American College of Chest Physicians, was a guest speaker before the Association of American Medical Colleges held at Richmond, Virginia, October 27-29.

For the past five years, Dr. Hayes has been Chairman of the Council on Undergraduate Medical Education of the College and through the efforts of this Council, a great deal of stimulus has been added to the improvement of teaching of undergraduate medical students in the subjects of tuberculosis and other chest diseases. Dr. Hayes has prepared a Schedule for the Teaching of Chronic Diseases of the Lungs in Medical Schools, which has been approved by the American College of Chest Physicians. Dr. Hayes presented this schedule to the deans at the meeting of the Association of American Medical Colleges at

Richmond.

En route to Richmond, Dr. Hayes stopped at the Chicago Offices of the College for a conference with the officers of the College.

Indiana Chapter Organized

The Indiana Chapter of the American College of Chest Physicians was organized at Indianapolis on September 24. The meeting was held at the time of the Indiana State Medical Society meeting and the following officers were elected: Merlin H. Draper, Fort Wayne, President; James S. McBride, Indianapolis, Vice-President; Thomas R. Owens, Muncie, Secretary-Treasurer.

Dr. Benjamin Goldberg, President of the College, officiated in the inauguration of the Indiana Chapter, and he was introduced by Dr. James H. Stygall, Governor of the College for Indiana.

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Organization News

Missouri Chapter Honors Dr. Paul H. Ringer

The Missouri Chapter of the College will give a cocktail party and smoker in honor of Dr. Paul H. Ringer, President of the Southern Medical Association and Regent of the American College of Chest Physicians. The Southern Medical Association is meeting at St. Louis, November 10-13, and the Missouri Chapter will be host to the visiting Fellows of the College at the cocktail party and smoker at the Jefferson Hotel (Parlor 8) on Wednesday, November 12, at 5:30 P. M.

The Fellows of the College who are planning on attending the meeting of the Southern Medical Association at St. Louis are requested to communicate with Dr. Paul Murphy, Secretary of the Missouri Chapter of the College, at the Robert Koch Hospital, Koch, Missouri.

Pennsylvania Chapter Meeting Postponed

Due to the hotel strike at Pittsburgh, the meeting of the Pennsylvania State Medical Society was called off and this necessitated making other arrangements for the meeting of the Pennsylvania Chapter of the College.

The officers of the Pennsylvania Chapter of the College made arrangements to hold this meeting on November 1st at the Cresson Sanatorium, Cresson, Pennsylvania, at the invitation of Dr. Thomas Stites, Medical Director of the Sanatorium. The program previously announced will be given at this meeting, followed by a dinner at 6:00 P. M. A business meeting of the Chapter will be held and officers for the ensuing year will be elected.

Dr. Hudson Visits Chicago

Dr. William A. Hudson, Governor of the College for Michigan spent Tuesday, October 21, at Chicago for a conference on College activities in the state of Michigan with officials of the American College of Chest Physicians.

Dr. Hudson attended a dinner Tuesday night in honor of Dr. Chevalier Jackson at the Palmer House, given in conjunction with the meeting of the American Academy of Ophthalmology and Otolaryngology at Chicago.

Illinois Chapter To Hold Meeting

The Illinois Chapter of the American College of Chest Physicians will hold a joint meeting with the Chicago Tuberculosis Society at the Bismark Hotel, Chicago, November 27. Dinner will be served at 6:30 P. M., to be followed by a scientific program. Dr. H. C. Hinshaw of the Mayo Clinic will give an address on "Chemotherapy in Experimental Tuberculosis."

Dr. J. Novak is Chairman of the Program Committee, and for reservations, kindly address Dr. Darrell Trumpe, St. John's Sanitarium, Springfield, Illinois, Secretary of the Illinois Chapter.

Important Announcement

Forms for information for listings in the 1942 Annual Directory of the American College of Chest Physicians have been prepared and placed in the mails. It is requested that the forms be completed and returned *promptly* to the Executive Offices of the College at Chicago. Additional information will be included in the listings to be published in the 1942 edition of the Roster of Membership and Pneumothorax Directory of the American College of Chest Physicians. If you haven't received a copy of form (E-25) for a listing in the 1942 Directory, please communicate *at once* with the Executive Offices of the College, 500 North Dearborn Street, Chicago, Illinois.

Constitution and By-Laws for State Chapters Approved

The committee appointed by the Board of Regents of the College has approved a standard Constitution and By-Laws for State and District Chapters of the College. Copies of the new Constitution and By-Laws have been mailed to the Secretaries of the State and District Chapters of the College. The new Constitution and By-Laws will be presented for approval before the meetings of the State and District Chapters of the College.

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Book Reviews

ELECTROCARDIOGRAPHY IN PRACTICE. Ashton Grabel, M.D., Instructor in Medicine, Courses for Graduates, Harvard Medical School. Paul D. White, M.D., Lecturer in Medicine, Harvard Medical School. W. B. Saunders Co., Philadelphia and London, 1941. Pages 319. Illustrations 272.

Electrocardiography in Practice by Grabel and White is the last of several books concerning this subject published recently.

Following a short summary of the principles and technique of electrocardiography the components of the normal electrocardiogram are explained. Part I of the book then discusses in detail the Electrocardiographic changes in the normal Heart at different ages and with changes in body position and build, the Heart in Disorders of Rhythm, and in the etiologic types of Heart Disease. Part II consists of 130 electrocardiograms for practice interpretation. They are not labeled but are accompanied by an explanation. This feature is a very important innovation and should prove of great value to the student as well as the practitioner who wishes to review the subject.

The book follows the plan of illustrating representative electrocardiograms on one page with the accompanying explanation and discussion on the opposite page. The presentation of the material is concise and orderly. The illustrations are excellent. The approach to the subject has been made in a very practical manner. Of significance in this respect is the authors' statement that errors in electrocardiographic interpretations are probably more often made by calling normal variations abnormalities than by missing real abnormalities when they are present.

In the past, books of this type have proven to be in favor with those interested in electrocardiography. I feel that "Electrocardiography in Practice" is one of the best in its field.

Charles N. Holman

THE CARE OF THE AGED (Geriatrics). Malford W. Thewlis, M.D. The C. V. Mosby Company, St. Louis, 1941.

This is the completely rewritten, third edition of the textbook on Geriatrics, which appeared in 1919. The only earlier work on the same subject was Nascher's book in 1914.

Thewlis' pioneering effort in the problem of the care of the aged has been well estab-

lished. Throughout the book, the author demonstrates his deep sympathetic interest in this special field, and he frequently shows a frank desire to place his own vast knowledge of the subject at the service of the general practitioner.

The book is divided into five sections. The first section deals exclusively with the general aspects of senescence. A brief history of Geriatrics is followed by a discussion of the anatomic and physiologic changes in old age, both in health and disease. The final chapters include prolongation of life, hygiene, and economic as well as medicolegal problems of the aged. Section II is devoted to preclinical medicine and the remaining sections to the various infectious and noninfectious diseases.

The author has made a successful attempt to cover every field of medicine in the volume. The book is well written, though there is considerable repetition in many of the chapters. The case reports are interesting and well done descriptively. The numerous tables, illustrations and photographs have been carefully selected. Full reference to source of material together with an excellent bibliography make this book of special value.

Walter I. Werner

THE AMERICAN RED CROSS AND TUBERCULOSIS—(Cont. from page 359)

Association, have conducted an educational campaign that probably has never been equalled in any other phase of health work in the world. This has resulted in searching for cases of tuberculosis while they are treatable; it has resulted in a campaign for the isolation of contagious cases of tuberculosis and has been responsible in no small way for the sharp decline in mortality, morbidity, and incidence of tuberculosis infection.

This accomplishment in the field of tuberculosis is cited as only one of the numerous splendid activities initiated or supported by the American Red Cross until other provisions have been made for their perpetuation. In almost any possible emergency where there is likely to be human suffering, such as that caused by severe storms, floods, fires, and war, it is only a matter of minutes, or at most a few hours, until Red Cross workers are present to provide for the greatest possible comfort of the victims. J. A. M.